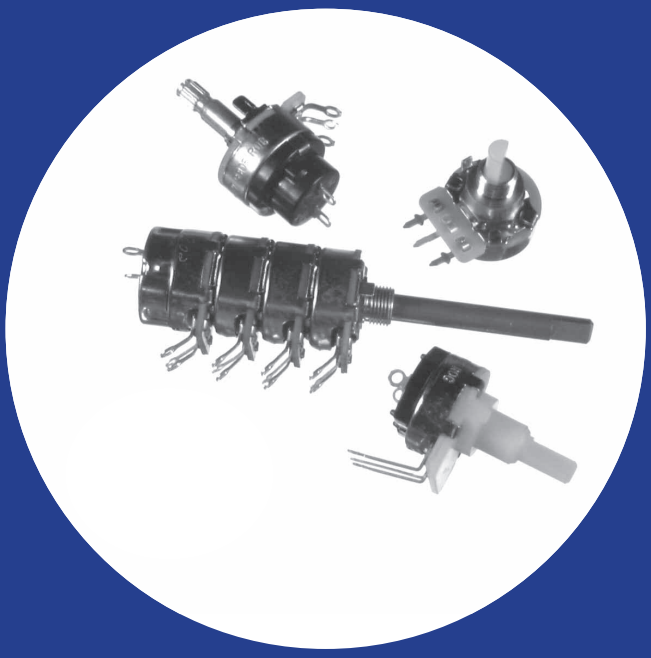
CTS®

Series 450 Technical Data

Industrial 15/16" (24mm) Diameter 1/2 Watt Composition Variable Resistors



Features

- Low cost
- Versatile mounting styles:
  - bushing
  - twist tab
  - bend tab
  - snap-in PC bracket
  - solder lug or PC terminals
- Wide resistance range
- Molded / metal shaft & bushing
- Pull-push, Push-push and rotary power switches
- Shaft and bushing waterseal available
- Rear extended shaft available
- Single, tandem, or concentric constructions
- Special vernier adjust (multiturn) construction available for fine adjustment
- Long life construction available

Electrical and Mechanical Specifications

Resistance Range

100 ohms through 10 megohms (linear taper)
Long life construction - 10K ohms through 5 megohms (linear taper)

Resistance Tolerance

Standard: ±20%
Special: ±10%

Power Rating, Watts

1/2 watt 10K ohms, 1/3 watt; above 10K ohms through 100K ohms, 1/4watt above 100K ohms. Full rating @ 55°C, derated to no load at 85°C

Voltage Rating

Bushing to Terminals:
High pot test, one minute
Standard construction – 1080VAC
Vernier construction – 1000VAC
Operating maximum – 750VDC
Across End Terminals:
500 VDC, load not to exceed listed wattage ratings.
Special: 1500/1800VAC high pot available.

Resistance Tapers

Standard – Linear,10% Audio and 10% CCW Audio
Special – Consult CTS

Rotational Angle

Standard Construction

Total Rotation: with rotary switch — 320° ± 5°
Total Rotation: without switch or with push-pull or push-push switches — 300° ± 5°

Vernier Adjust Construction

Shaft Rotational Angle
VA-450 – 3700° – 10 1/4 turns
5VA-450 – 2000° – 5 1/2 turns

Effective Rotation

With or without switch — 300° (approximate)
Special angle available — consult CTS

Bushing Information

Diameter: EIA Standard 3/8"-32 UNEF-2A thread.
Standard length: 3/8" or 1/4" (9.53mm or 6.35mm)
Special length available upon request
Metric bushing available upon request

RoHS Compliant

All models of 450 series pot. are now RoHS compliant except 040 and 041 push-push power switches. The two models of power switches are RoHS compliant available upon request.

(continued on next page)

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Electrical and Mechanical Specifications (continued)

Locating Lugs (Bushing Mounted Style)

Standard Position : Left side with terminals facing inward

Available : No lug, right lug or two lugs with terminals facing inward

Shaft Information

Metal Shafts : Aluminum standard

Length : Standard — Up to 3" in 1/8" increments.
Special — Consult CTS

Diameter : Standard — .250" (6.35mm)
Special — Consult CTS

Molded Shafts —

Length : Standard — Round, Flatted & knurled shafts available up to 11/2" (38.1mm) in 1/8" (3.2mm) increments
Special — Some molded shaft designs available up to 2" (50.8mm). Consult CTS

Diameter : Diameter over knurl — .240" – .246" (6.10mm – 6.25mm)

Color : Colors are available.

Metal Tubing Shafts —

Length : Standard — Up to 3" (76.2mm)
Special — Consult CTS

Outside Diameter :

Rear Extended Shafts — 265" (6.73mm) or .250"(6.35mm)
Metal or molded rear extended shafts available.

Typical Constructions

The following is basic information on the most common CTS 15/16" (24mm) diameter composition variable resistor constructions supplied to our customers. Space limitations prohibit showing the virtually thousands of additional constructions fabricated to exacting customer specifications. For your special applications the CTS engineering staff is at your disposal for designing the best and most economical construction to meet your requirements.

Vernier Constructions

This construction is designed for fine tuning applications. It provides precision adjustments in 3700° (10 1/4 turns) or 2000° (5 1/2 turns)

Long Life Construction

This construction provides an extended life of 250,000 cycles (with a limited rotation angle) and is available with resistance ranging from 10K ohms to 5 megohms, linear taper only. Consult CTS for other tapers.

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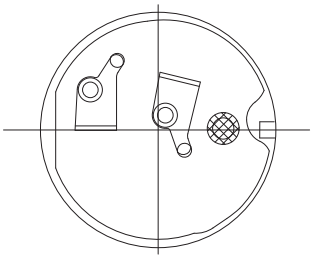
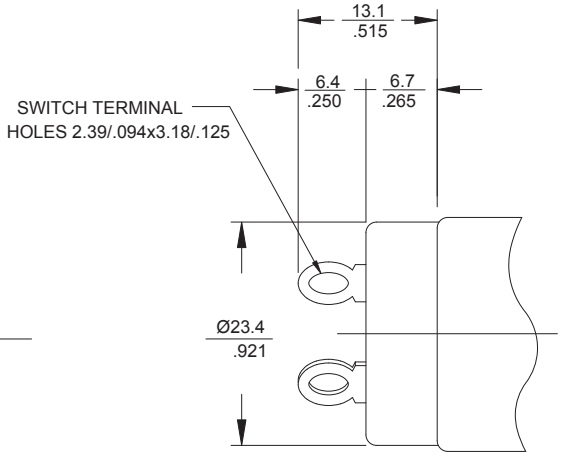
Series	Contact Arrangement	Electrical Rating	Outline Drawing
FR-GC	SPST Rotary	3 amps @ 125 volts, 1 amp @ 250 volts AC UL Recognized	
GC	SPST Rotary	5 amps @ 20 volts DC (Automotive)	

Actuating angle – 20˚

Actuating Torque – 7 to 17 in. oz. (504 to 1225 gf-cm)



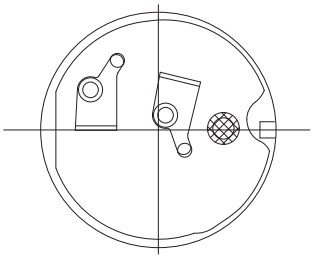


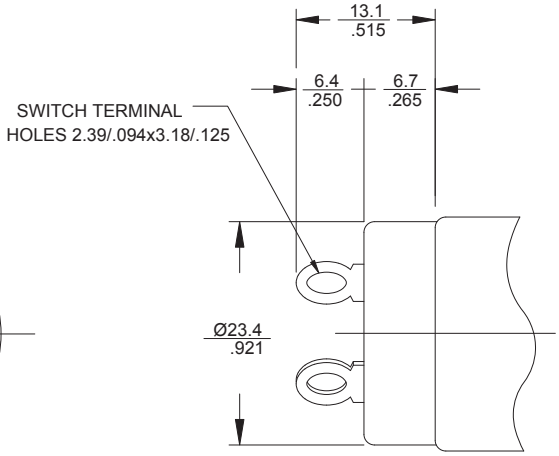
DIMENSION: mm / inch

Series	Contact Arrangement	Electrical Rating	Outline Drawing
TGC	SPST Rotary	6 amps @ 125 volts AC UL & CSA Recognized	

Actuating angle – 20˚

Actuating Torque – 7 to 17 in. oz. (504 to 1225 gf-cm)



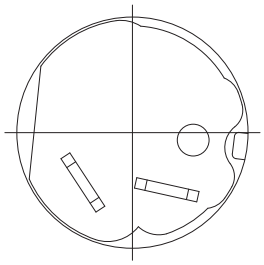


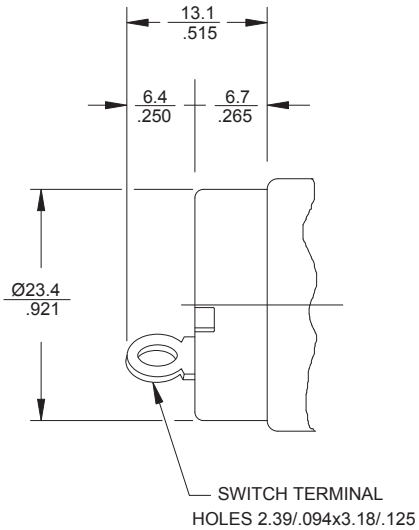
DIMENSION: mm / inch

Series	Contact Arrangement	Electrical Rating	Outline Drawing
TV-023	SPST Rotary	TV-5 rating UL & CSA Recognized	

Actuating angle – 20˚

Actuating Torque – 10 to 20 in. oz. (720 to 1441 gf-cm)





DIMENSION: mm / inch

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POWER SWITCHES

Series	Contact Arrangement	Electrical Rating	Outline Drawing

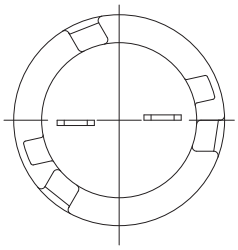
040

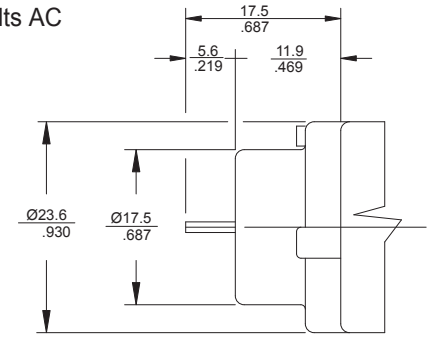
SPST
Push-on
Push-off

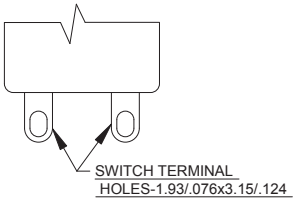
6 amps @ 125 volts AC

Pretravel 13/64”(5.2,mm)

Activating Force -2 to 5 lb
(0.9 to 2.3 kgf)







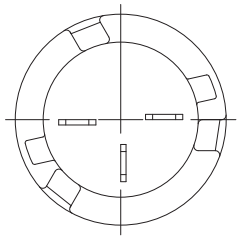
DIMENSION: mm / inch

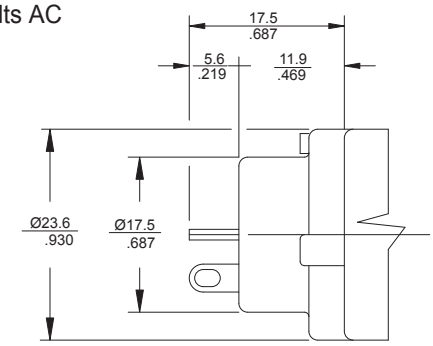
041

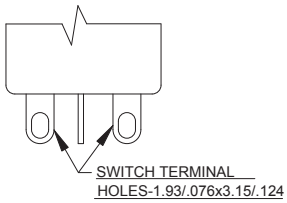
SPDT
Push-on
Push-off

6 amps @ 125 volts AC

Pretravel 13/64”(5.2mm)
Activating Force -2 to 5 lb
(0.9 to 2.3 kgf)







DIMENSION: mm / inch

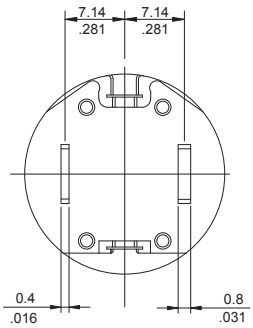
050

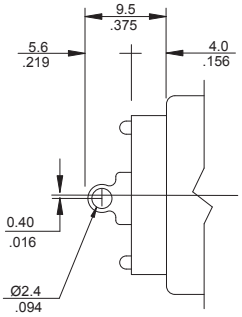
SPST
Rotary

3 amps @ 125 volts AC
(Shallow construction switch)
UL & CSA Recognized
7 1/2 amps @ 20 volts DC
(Automotive)

Actuating angle – 25˚

Actuating Torque – 2 to 15 in. oz.
(144 to 1080 gf-cm)





DIMENSION: mm / inch

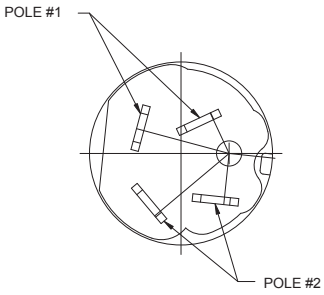
FR-027

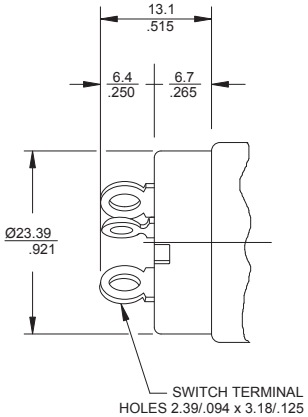
DPST
Rotary

3 amps @ 125 volts,
1 amp @ 250 volts AC
UL Recognized

Actuating angle – 20˚

Actuating Torque – 10 to 20 in. oz.
(720 to 1441 gf-cm)





DIMENSION: mm / inch

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POWER SWITCHES

Series	Contact Arrangement	Electrical Rating	Outline Drawing

TV-020

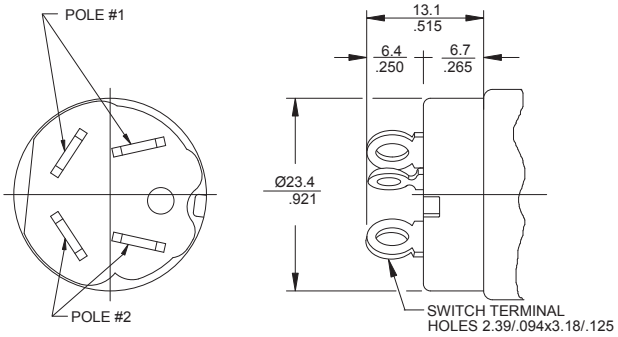
DPST
Rotary

125 volts AC
Pole #1, TV-1 rating
Pole #2, TV-3 rating
UL & CSA Recognized

Actuating angle – 20˚

Actuating Torque – 10 to 18 in. oz.
(720 to 1297 gf-cm)

DIMENSION: mm / inch



FR-028

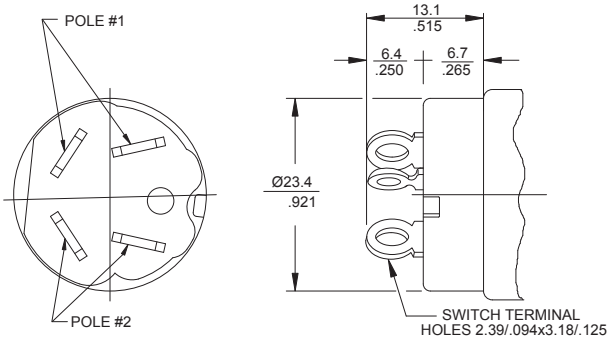
SPDT
Rotary

3 amps @ 125 volts AC
UL Recognized

Actuating angle – 20˚

Actuating Torque – 10 to 20 in. oz.
(720 to 1441 gf-cm)

DIMENSION: mm / inch



TV-021

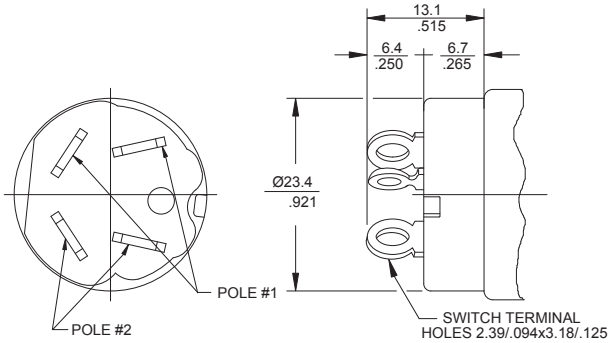
SPDT
Rotary

TV-4 rating
UL Recognized

Actuating angle – 20˚

Actuating Torque – 10 to 18 in. oz.
(720 to 1297 gf-cm)

DIMENSION: mm / inch



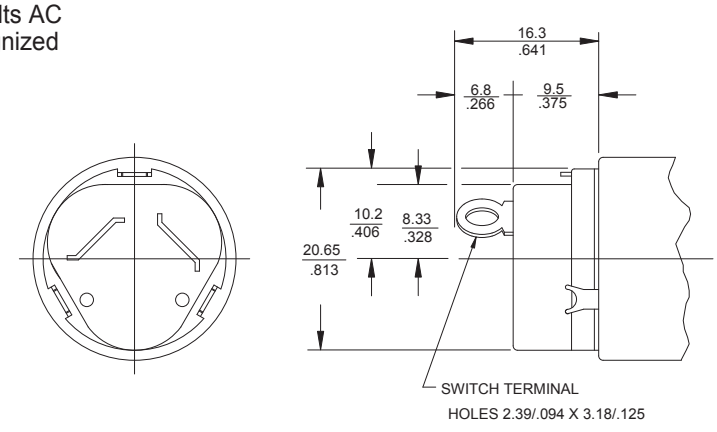
FR-K

SPST
Pull-on
Push-off

3 amps @ 125 volts AC
UL & CSA Recognized

Pretravel - 5/32" (3.97mm)
Actuating force - 7 to 16 oz. - Single section control
(200 to 1000 gf)
7 to 20 oz. - Tandem control
(200 to 1250 gf)

DIMENSION: mm / inch



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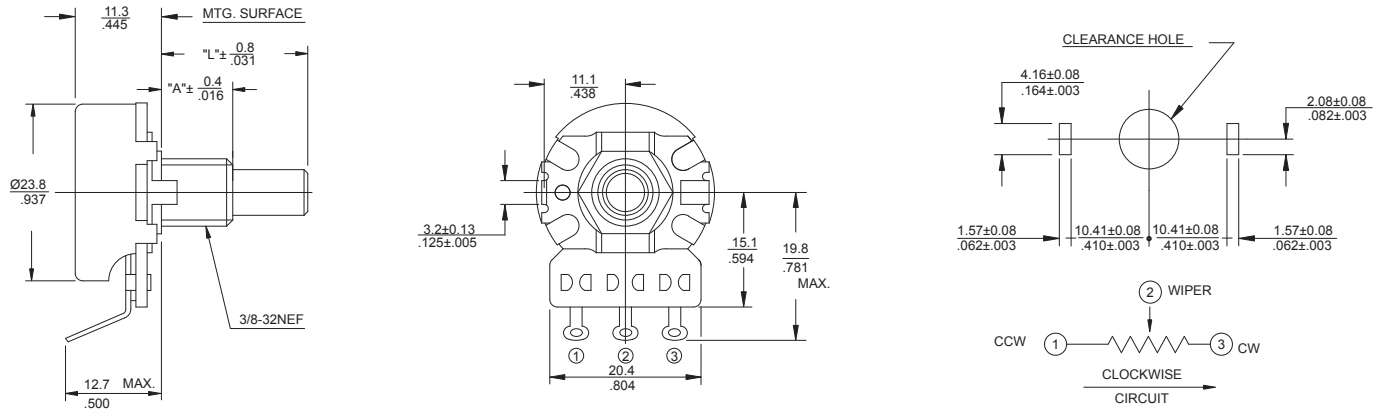
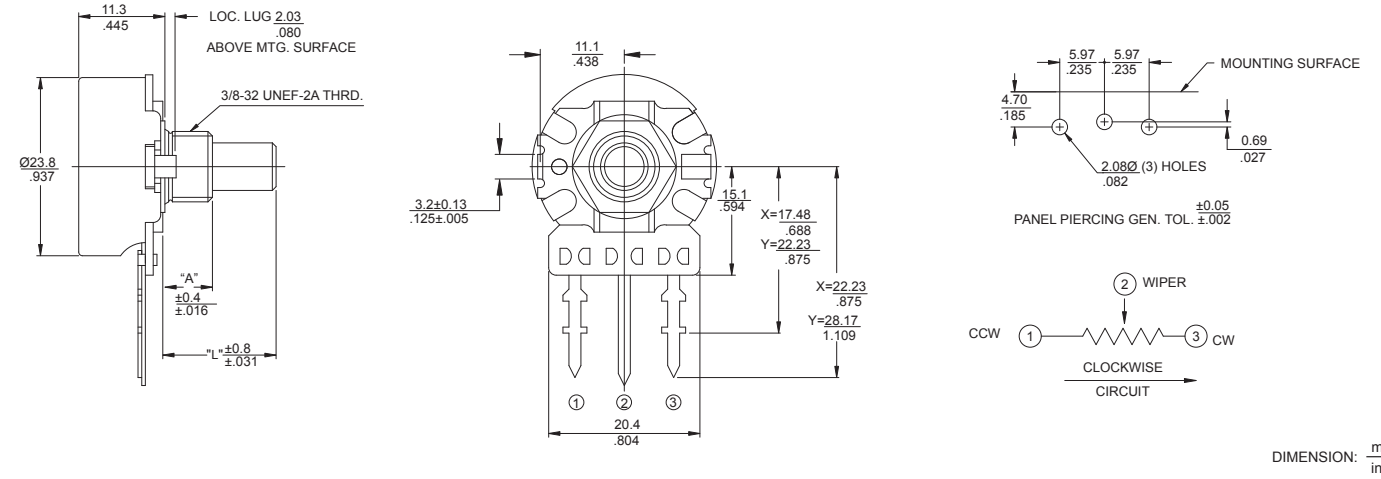
T450 Metal Shaft, Bushing Mounting, Type "T" Solder Lug Terminals



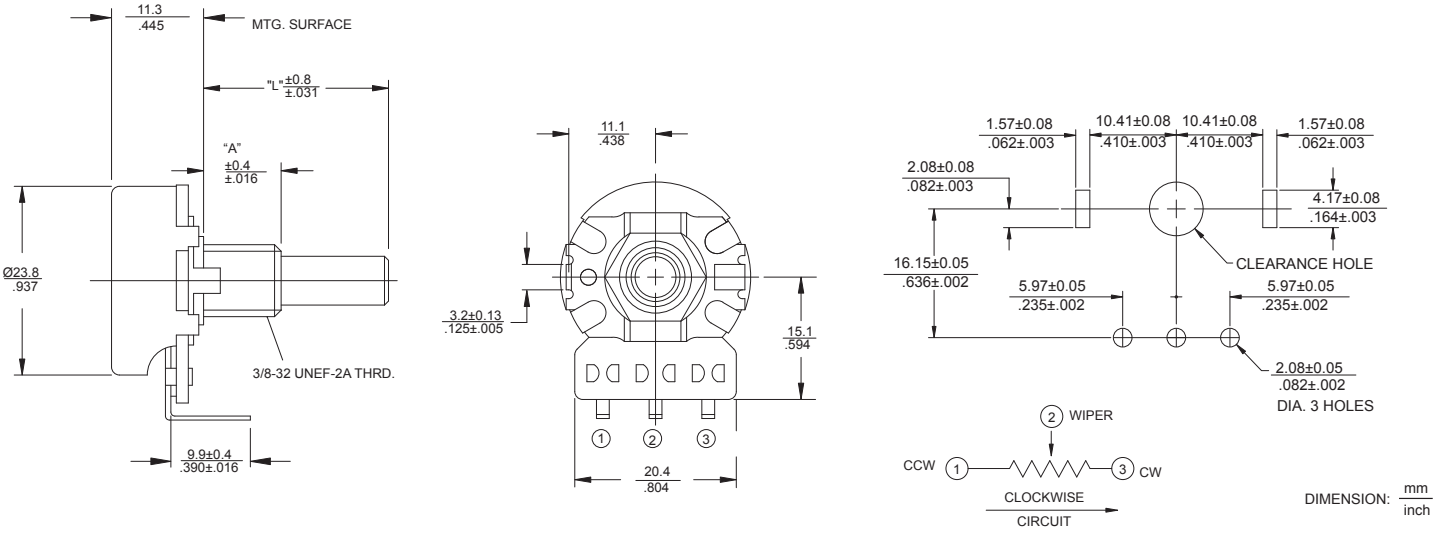
DIMENSION: mm / inch

X450 / Y450 Metal Shaft, Bushing Mounting, Printed Circuit Type "X" Or "Y" Terminals



DIMENSION: mm / inch

U450 Metal Shaft, Bushing Mounting, Printed Circuit Type "U" Terminals



DIMENSION: mm / inch

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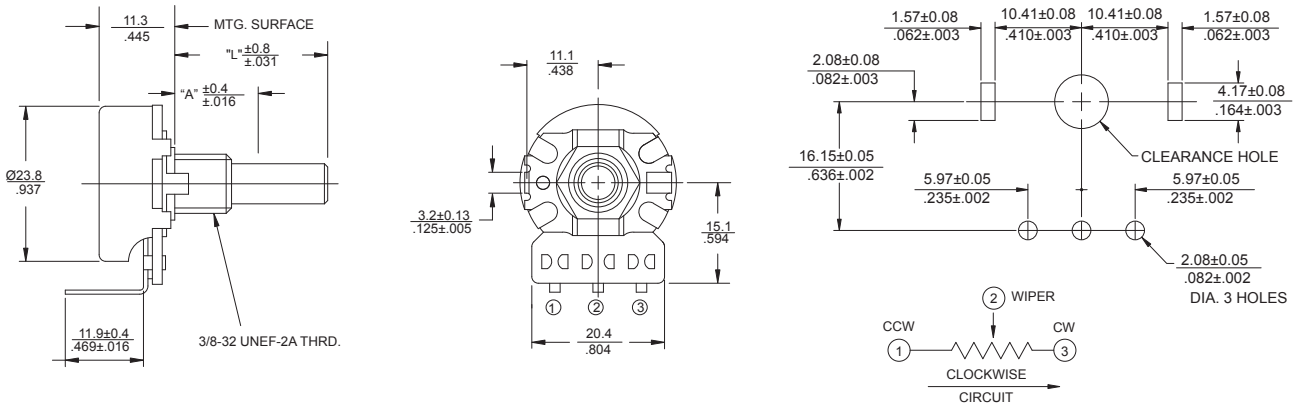
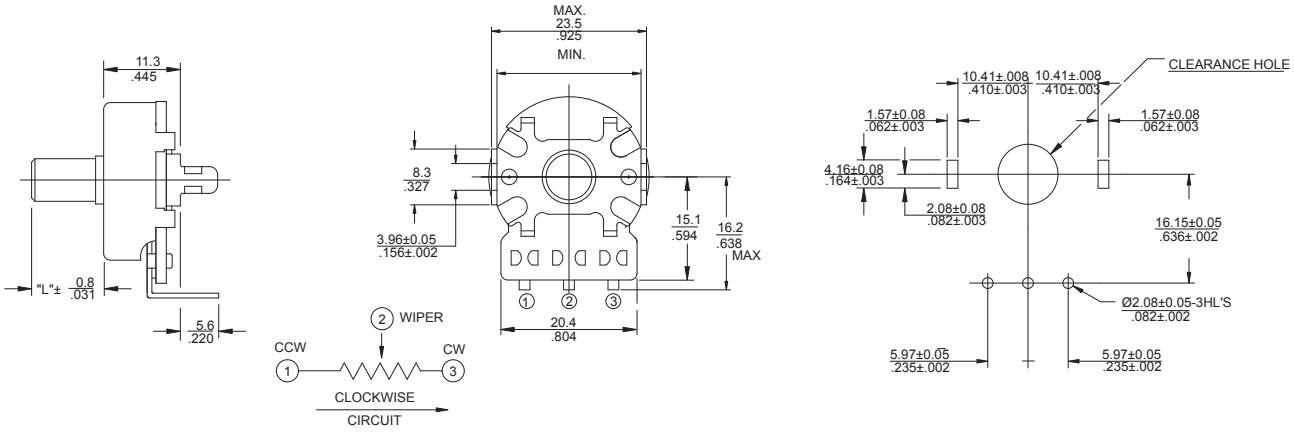
V450 Metal Shaft, Busing Mounting, Printed Circuit Type “V” Terminals



DIMENSION: mm / inch

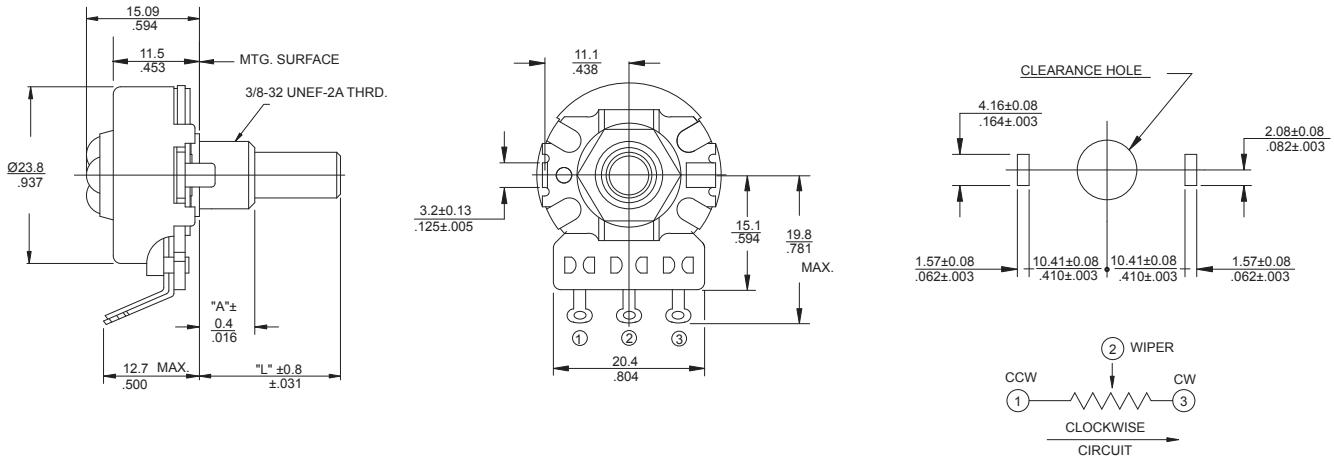
UPE450RE Rear Extended Metal Shaft, Twist Tab Mounting, Printed Circuit Type "U" Terminals



DIMENSION: mm / inch

* Consult CTS for details

VA-T450 & 5VA-T450 Metal Shaft, Bushing Mounting, Type “T” Solder Lug Terminals, Vernier Adjust



DIMENSION: mm / inch

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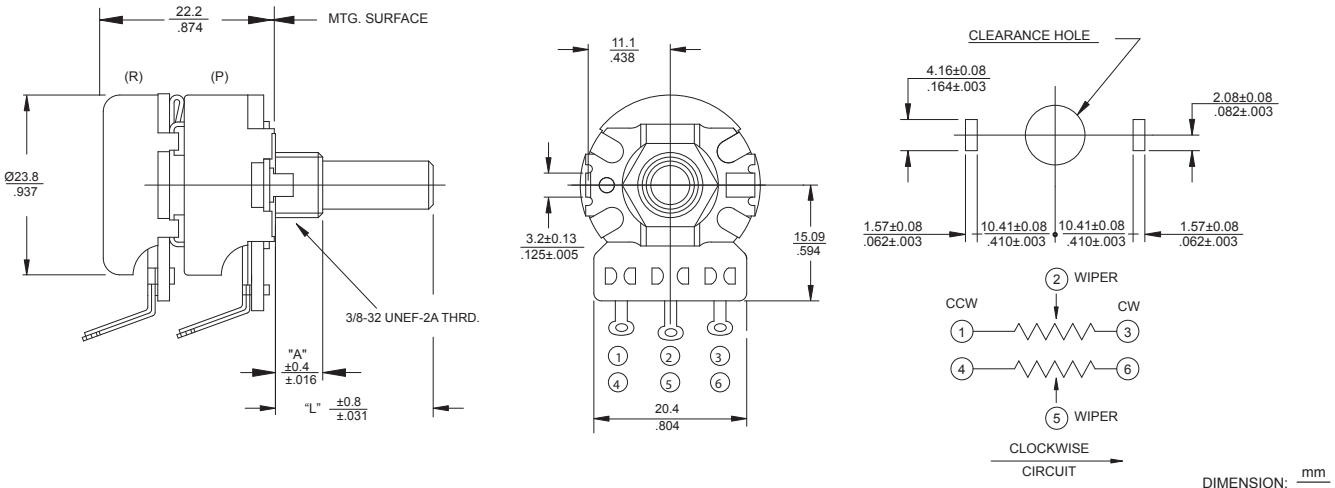
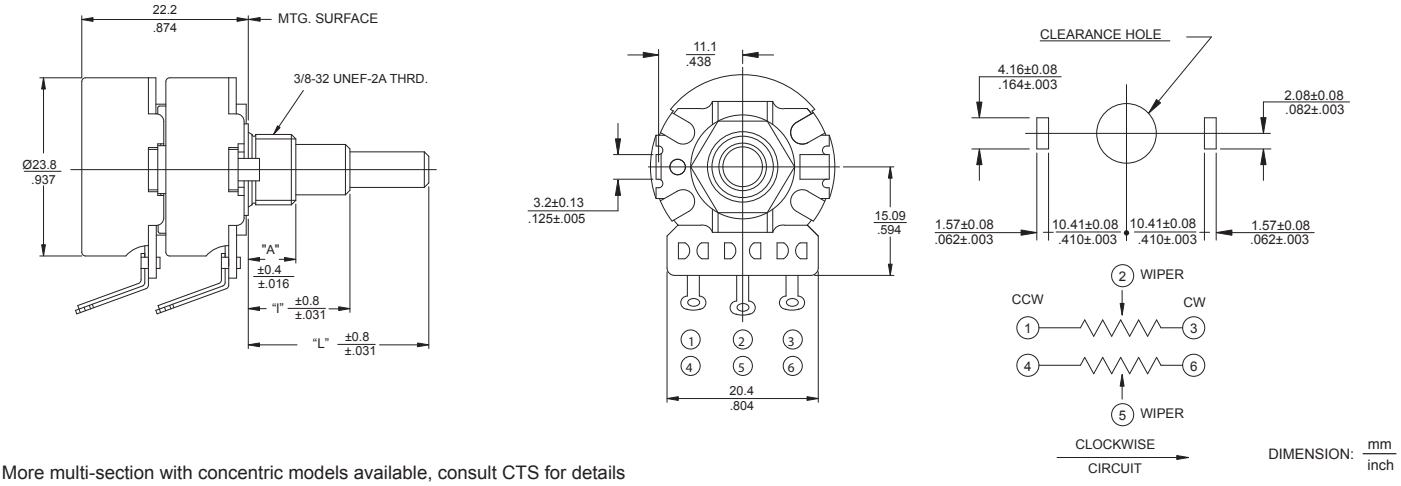
T2-450 Dual-section, Metal Shaft, Bushing Mounting, Type “T” Solder Lug Terminals



DIMENSION: mm / inch

* More multi-section models available, consult CTS for details

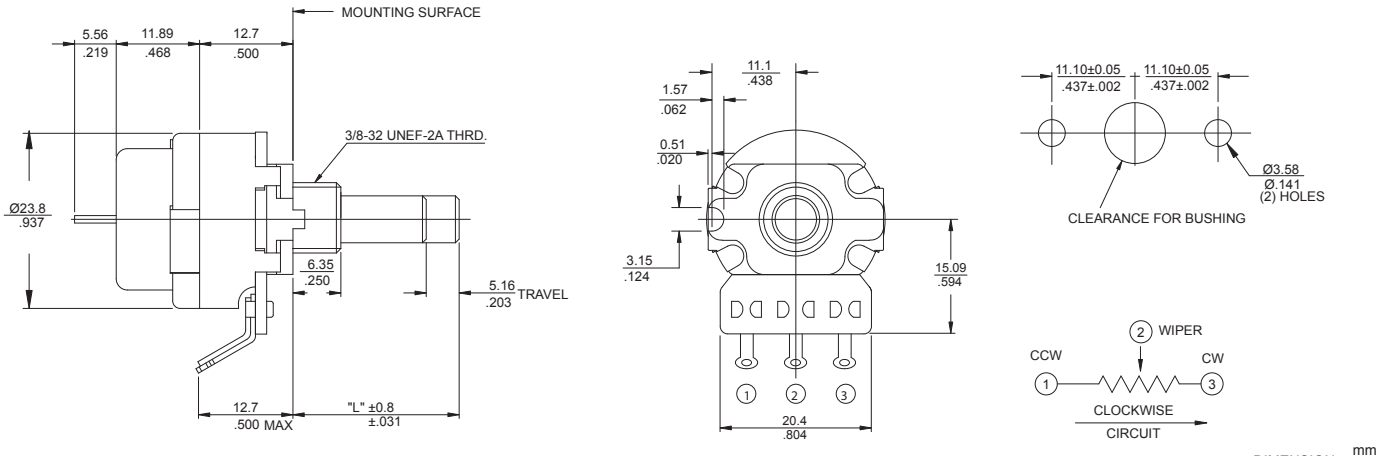
TC2-450 Dual-section, Concentric Metal Shafts, Bushing Mounting, Type “T” Solder Lug Terminals



DIMENSION: mm / inch

* More multi-section with concentric models available, consult CTS for details

040-TMG450 Metal Shaft, Bushing Mounting with Insulated Plate, Type “T” Solder Lug Terminals, 040 Switch



DIMENSION: mm / inch

* Refer to Ordering Information for switch details

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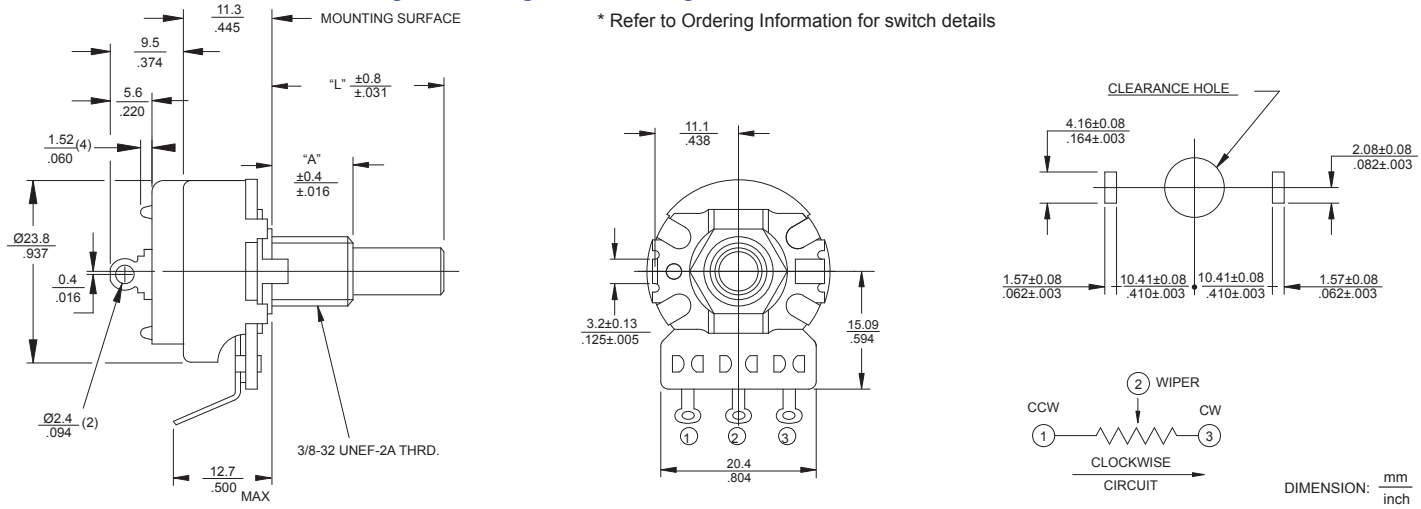
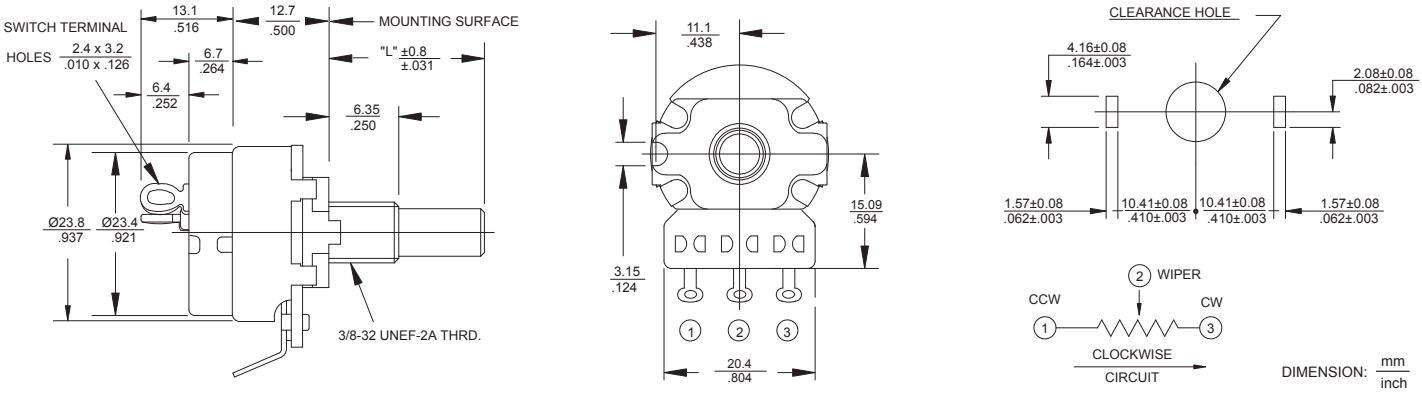
050-T450 Metal Shaft, Bushing Mounting, Solder Lug terminals, 050 Switch

* Refer to Ordering Information for switch details



TGC-TMG450 Metal Shaft, Bushing Mounting with Insulated Plate, Type "T" Solder Lug Terminals, TGC Switch

* Refer to Ordering Information for switch details



Ordering Information

450 T 2 20 R 103 B 1 A 1

TERMINAL STYLE
- **T** – SOLDER LUG
- **X** – PC(.688"(17.5mm) HEIGHT)
- **Y** – PC(.875"(22.2mm) HEIGHT)
- **U** – FORMED TO FRONT
- **V** – FORMED TO REAR

MOUNTING STYLE "A"

BUSHING LENGTH: 1/8" (3.2mm) INCREMENTS EXAMPLES:
- **1** – TWIST TAB MOUNT
- **2** – .250" (6.35mm)
- **3** – .375" (9.53mm)
- **8** – 1.000" (25.4mm)
- **A** – .250" (6.35mm) DIECAST
- **B** – .375" (9.53mm) DIECAST
- **M** – .250" (6.35mm) MOLDED

SHAFT LENGTH "L"

FROM MOUNTING SURFACE 1/32" (0.8mm) INCREMENTS

METAL SHAFT EXAMPLES:
- **20** – .625" (15.9mm)
- **24** – .750" (19.1mm)
- **28** – .875" (22.2mm)
- **32** – 1.000" (25.4mm)

*** MOLDED SHAFT**
- **M1** – .500" (12.7mm)
- **M2** – .625" (15.9mm)
- **M3** – .750" (19.1mm)
- **M4** – .875" (22.2mm)
- **M5** – 1.000" (25.4mm)

* 0.014" shaft length reduced when molded mounting style applied

* Available for non switch and rotary switche models

RESISTANCE CODE EXAMPLES

CODE	RESISTANCE
501	500 OHMS
102	1K
252	2.5K
502	5K
103	10K
253	25K
503	50K
104	100K

SHAFT TRIM
- **R** – ROUND
- **F** – FLATTED .375" X .156" (9.5mm X 4.0mm)
- **K** – KNURLED METAL SHAFT (.236"(6.0mm) DIA OVER KNURL 24 TEETH)

  MOLDED SHAFT

  (.240"-.246" Dia over knurl 24 teeth)
- **S** – SD SLOT .063" DEEP X .047" WIDE (1.6mm X 1.2mm)

TAPER
- **1** – LINEAR
- **2** – 10% AUD
- **3** – 10% CCW AUD

RESIST TOL
- **A** – ±10%
- **B** – ±20%

SPECIALS
- **1** – LEFT SIDE LUG *
- **4** – RIGHT SIDE LUG *
- **5** – NO LOCATING LUG
- **6** – BOTH SIDE LUG

* AVAILABLE FOR MOLDED MOUNTING BUSHING

SWITCHES	FUNCTION	CTS TYPE
A – NONE		
B – SPST	ROTARY	050
C – SPST	ROTARY	TGC
D – DPST	ROTARY	027
E – SPDT	ROTARY	028
F – SPST	PULL-PUSH	FRK
G – SPST	PUSH-PUSH	040
H – SPDT	PUSH-PUSH	041
J – SPST	ROTARY	FR-GC
K – NONE	VERNIER ADJUST	10 1/4 turns
L – NONE	VERNIER ADJUST	5 1/2 turns

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